

CLAIMS

What is claimed is:

1. A near field recording/reproducing optical head for use with a recording medium, comprising:
 - a light unit which radiates light having a predetermined wavelength at the recording medium and detects the light reflected from a recording surface of the recording medium; and
 - a slider which is raised above the recording medium by dynamic air pressure attendant upon the rotation of the recording medium, the slider comprising an optical waveguide probe which comprises:
 - an optical waveguide installed at the slider and having an end facing the recording medium, the optical waveguide transmitting the light from the light unit to the recording medium and transmitting the light reflected from the recording medium to the light unit; and
 - a self focusing layer formed of a nonlinear optical material, of which the refractive index changes according to an intensity of an incident light beam, at the end of the optical waveguide facing the recording medium, the self focusing layer condensing the light incident from the optical waveguide, to form a light spot on the recording medium.
2. The near field recording/reproducing optical head of claim 1, further comprising a mask between the self focusing layer and the recording medium, the mask comprising a quadrilateral or circular light transmitting portion having a width smaller than a width of the light incident from the self focusing layer.
3. The near field recording/reproducing optical head of claim 2, wherein the self focusing layer is formed of a material selected from the group consisting of As_2S_3 , oxide and material with a GaAs quantum dot.
4. The near field recording/reproducing optical head of claim 3, wherein the optical waveguide comprises an optical fiber.
5. The near field recording/reproducing optical head of claim 1, wherein the self focusing layer is formed of a material selected from the group consisting of As_2S_3 , oxide and material with a GaAs quantum dot.

6. The near field recording/reproducing optical head of claim 5, wherein the optical waveguide is formed of an optical fiber.

7. The near field recording/reproducing optical head of claim 2, wherein the optical waveguide is formed of an optical fiber.

8. The near field recording/reproducing optical head of claim 1, wherein the optical waveguide is formed of an optical fiber.

9. The near-field recording/reproducing optical head of claim 1, wherein the optical waveguide is formed of a single-mode or multi-mode optical fiber.

10. The near-field recording/reproducing optical head of claim 1, wherein the optical waveguide is an optical fiber having a first portion adjacent to the light unit extending in a first direction parallel to a surface of the recording medium and a second portion adjacent to the self focusing layer extending in a second direction parallel to the first direction.

11. The near-field recording/reproducing optical head of claim 1, wherein a refractive index n of the self focusing layer is

$$n = n_0 + n' I;$$

wherein a basic refractivity component is represented by n_0 , a refractivity component changing according to the intensity of the incident light beam is represented by n' , and the intensity of the incident light beam is represented by I .

12. The near-field recording/reproducing optical head of claim 1, wherein a region of the self focusing layer nearer to an optical axis thereof has a larger refractive index than that of a region farther from the optical axis.

13. The near field recording/reproducing optical head of claim 1, further comprising a mask between the self focusing layer and the recording medium, the mask comprising a light transmitting portion having a width smaller than a width of the light incident from the self focusing layer.

14. The near field recording/reproducing optical head of claim 1, wherein the light transmitting portion is a transparent material.

15. The near field recording/reproducing optical head of claim 1, wherein the light transmitting portion is a light transmitting hole.

16. The near field recording/reproducing optical head of claim 1, wherein the self focusing layer comprises a nonlinear optical material.

17. A near-field recording/reproducing optical head for use with a recording medium, comprising:

a light unit radiating and detecting light of a predetermined wavelength to and from the recording medium;

a slider;

an optical waveguide positioned at said slider, a first end of the optical waveguide transmitting the radiated light from said light unit to a second end of the optical waveguide and toward the recording medium;

a self focusing layer of a nonlinear optical material formed at said second end of the optical probe with a refractive index changing according to the intensity of the radiated light received from said light unit, said self focusing layer condensing the radiated light to form a spot on the recording medium.

18. The near-field recording/reproducing optical head according to claim 17, further comprising a mask between said self focusing layer and the recording medium.

19. The near-field recording/reproducing optical head according to claim 18, wherein the mask is coated on a surface of said self focusing layer facing the recording medium.

20. A near-field recording/reproducing optical head for use with a recording medium, comprising:

a light unit radiating and detecting light of a predetermined wavelength to and from the recording medium;

an optical waveguide having a first surface to receive the radiated light and a second surface to receive the light from the recording medium, the optical waveguide transmitting the radiated light and the light from the recording medium between the first and second ends; and

a self focusing layer of a nonlinear optical material formed at the second surface of the optical waveguide, to condense the radiated light to form a spot on the recording medium.